

## **Title V**

### **Model General Permit Template**

#### **SERIES 4 INTERNAL COMBUSTION ENGINES**

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##### **Template # SJV-IC-4-0**

**fired on liquefied petroleum gas with a sulfur content of  
less than 0.008% by weight (15 gr/100 ft<sup>3</sup>)**

This template is designed to streamline the Title V permitting process for internal combustion engines meeting the above qualifications. Applicants for Title V permits choosing to use this template will only have to complete the enclosed template qualification form and submit it with their Title V application.

**San Joaquin Valley Unified Air Pollution Control District  
FINAL**

**Title V Model General Permit Template  
Series 1 Internal Combustion Engines**

**Template No: SJV-IC-4-0**

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**FINAL DECISION DATE:**

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# **SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT**

## **TITLE V GENERAL PERMIT TEMPLATE SJV-IC-4-0**

### **ENGINEERING EVALUATION**

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# Template #SJV-IC-4-0

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## I. Purpose

The purpose of the proposed template is to streamline the Title V permitting process and reduce the time required by the applicant and the District by identifying the federally applicable requirements for internal combustion (IC) engines and establishing permit conditions which will ensure compliance with such requirements. These conditions will be incorporated into the Title V permit of any facility choosing to make use of the template.

## II. Template Applicability

The template applies to any internal combustion (IC) engine which is fired on Liquefied Petroleum Gas (LPG) with a sulfur content of less than 0.008% by weight. The applicability of this template can best be established by answering the questions in the Template Qualification Form attached as Appendix D.

## III. Applicable Requirements

Units may be subject to “federally enforceable “ requirements as well as requirements that are enforceable by the “District-only”. Federally enforceable requirements will be enforceable by the EPA and the public through Title V permit conditions identified as federally enforceable. District-only requirements represent local or state regulations for which the EPA has no direct enforcement authority. The final Title V permits issued by the District will contain both federally enforceable and District-only requirements.

District-only requirements are not addressed in this template. Table 1, Applicable Requirements, does not necessarily include all federally enforceable requirements that apply to IC engines qualifying to use this template, and it is the source’s responsibility to determine any and all applicable requirements to which the source is subject. Generally, requirements not addressed by this template are those that require a source-specific analysis, or are covered by other templates.

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Rule Category	Rule/Regulation	Citation	Description
A	SJVUAPCD Reg. IV	4201 Section 3.1	Particulate Matter Concentration
A	County Rule	404 <sup>1</sup>	Sulfur Compounds
A	County Rule	406 <sup>2</sup>	Sulfur Compounds
A	County Rule	407 <sup>3</sup>	Sulfur Compounds
A	SJVUAPCD Reg. II	2520, 9.4.2, 9.5.2	Periodic Monitoring and Recordkeeping
B	SJVUAPCD Reg. II	2201	New Source Review Rule
B	SJVUAPCD Reg. II	2520	Federally Mandated Operating Permits
B	SJVUAPCD Reg. IV	4101	Visible Emissions

Category “A” rules contain requirements that are directly applicable to the qualifying units; compliance with these applicable requirements will be demonstrated in this engineering evaluation and assured by the template permit conditions. In section IV, Compliance, the federally-enforceable requirements from category “A” rules are listed with a discussion of how compliance with these requirements is achieved.

Category “B” rules contain federally enforceable requirements that were not addressed in this template. These may not be all of the federally enforceable requirements for this unit. Requirements from these rules must be addressed by the applicant outside of this template within the Title V application Compliance Plan form (TVFORM-004). Category “B” listing is included in this table as an informational item to assist applicants in this effort.

### IV. Compliance

This section contains a discussion of how compliance is assured with each requirement addressed in this template.

#### District Rule 4201

Section 3.1 requires emissions to be at or below 0.1 grain of particulate matter per dry standard cubic foot of exhaust gas. The following analysis shows that the internal combustion (IC) engines that are covered by this template satisfy this condition.

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<sup>1</sup> Madera

<sup>2</sup> Fresno

<sup>3</sup> Kings, Merced, San Joaquin, Tulare, Kern, and Stanislaus

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The following analysis shows compliance for LPG fired IC engines:

$$\left[ \frac{0.0007(\#PM)}{10^6(Btu)} \right] X \left[ \frac{7000(grains)}{(\#)} \right] X \left[ \frac{10^6(Btu)}{8710(dscf)} \right] = 0.00056 \frac{grain}{dscf}$$

$$\text{where} \quad \frac{0.0007 \#PM}{10^6 Btu} = \text{Emission Factor}^4$$
$$\frac{10^6(Btu)}{8710(dscf)} = \text{F Factor}^5$$

A permit condition will be added to limit the maximum particulate emissions to 0.1 gr/dscf. (see template conditions #2). However since compliance is assured with the PM limit by the use of LPG which is required by template condition #1, no monitoring of PM is required.

Rules 402 (Madera) and 404 (in all seven remaining counties in the San Joaquin Valley) are replaced by Unified District Rule 4201. The above analysis shows compliance with all these rules, regardless of which are SIP approved at the time of permit issuance.

By using this template the applicant is requesting a permit shield from the requirements of Rules 402 (Madera) and 404 (in all seven remaining counties in the San Joaquin Valley) and for Rule 4201 through template permit condition #6 and #7.

### County Rule 404 (Madera), 406 (Fresno) and 407 (all six remaining counties in the San Joaquin Valley)

These county rules contain a limit on sulfur compounds. The limit at the point of discharge is 0.2 percent by volume, 2000 ppmv, calculate as sulfur dioxide (SO<sub>2</sub>), on a dry basis averaged over 15 consecutive minutes (see template permit condition #3).

The following analysis shows that the internal combustion (IC) engines that are covered by this template are in compliance with this sulfur emissions limit.

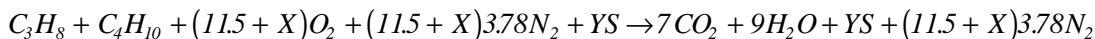
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<sup>4</sup> AP-42 Table 3.2-5

<sup>5</sup> 40 CFR 60 Appendix A Table 19-1

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Assuming the Liquefied Petroleum Gas is 50% Propane and 50% Butane, the combustion equation is (neglecting  $\text{NO}_x$  and  $\text{SO}_x$  relative to  $\text{O}_2$  in the exhaust):



where  $X$  = moles of excess air  
 $Y$  = moles of sulfur in the fuel

solving an expression for the fraction of  $\text{O}_2$  in the exhaust by volume gives:

$$\frac{X}{16 + X + (11.5 + X)3.78} = 0.04 \Rightarrow X = 2.94$$

where 16 = combined total moles of  $\text{CO}_2$  and  $\text{H}_2\text{O}$  in the exhaust  
0.04 = fraction of  $\text{O}_2$  in the exhaust by volume

solving for  $Y$  in an expression for the fraction of  $\text{SO}_2$  in the dry exhaust by volume gives:

$$\frac{Y}{7 + 2.94 + 54.5} = 0.002 \Rightarrow Y = 0.129$$

where  $Y$  = mole fraction of S per mole of  $\text{CH}_4$  combusted  
7 = moles of  $\text{CO}_2$  in exhaust  
54.5 = moles of  $\text{N}_2$  exhaust  
0.002 = 2000 ppmv  $\text{SO}_x$  emission limit

Use  $Y$  to calculate the weight fraction of S in 1 mole of LPG:

$$\frac{(0.129)(32.06)}{102.18 + (0.129)(32.06)} = 0.039 = 3.9\% \text{ S by weight in the fuel}$$

where 32.06 = molecular weight of sulfur (S)  
102.18 = average molecular weight of  $\text{C}_3\text{H}_8$  and  $\text{C}_4\text{H}_{10}$   
0.0105 = fraction of S by weight in the fuel

Combustion of LPG with a sulfur content of less than 3.9% by weight will assure compliance with District Rule 4801. Specifications for LPG are shown in Appendix C. According to this table the sulfur content of commercial grade LPG is 15

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grains per 100 cubic feet or less. Converting this to a percentage by weight of LPG yields:

$$\% S \left( \frac{lb S}{lb LPG} \right) = 100 \times \left( \frac{15 gr}{100 ft^3} \right) \left( \frac{1 lb}{7000 gr} \right) \left( \frac{24.45 L}{mol LPG} \right) \left( \frac{1 mol LPG}{102.18 g} \right) \left( \frac{453.59}{1 lb} \right) \left( \frac{0.035 ft^3}{1 L} \right)$$
$$= 0.0080\% S$$

0.008% sulfur by weight is much less than the maximum of 3.9% which will assure compliance with the sulfur emissions limit of 2000 ppmv. The use of commercially available LPG with a maximum of 15g/100 ft<sup>3</sup> is required by template permit condition #1.

Rules 406 (Fresno), 404 (Madera), 407 (in all six remaining counties in the San Joaquin Valley). By using this template the applicant is requesting a permit shield from the requirements of Rule 406 (Fresno), Rule 404 (Madera), Rule 407 (Tulare, Kings, Stanislaus, Merced, San Joaquin, and Kern) (see template permit conditions #6 and #7).

### District Rule 2520, 9.4.2 and 9.5.2

Section 9.4.2 requires that periodic monitoring be performed if none is associated with a given emission limit to assure compliance. Periodic monitoring consisting of source testing for fuel sulfur content will be supported by template permit condition #4.

Section 9.5.2 requires all records of required monitoring and support information be maintained for at least five years. Template permit condition #5 requires that all such records be maintained for at least five years.

## **V. Permit Shield**

A permit shield legally protects a facility from enforcement of shielded regulations when a source is in compliance with the terms and conditions of the Title V permit. Compliance with the terms and conditions of the Title V permit is considered compliance with all applicable requirements upon which those conditions are based, including those that have been subsumed. A permit shield is requested in template permit conditions #6 and #7.

## **VI. Permit Conditions**

The following conditions will be incorporated into the Title V permit of any facility choosing to make use of template #SJV-IC-4-0.



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1. Unit shall be fired on liquefied petroleum gas (LPG) with a sulfur content of less than or equal to 0.008% by weight (15 gr/100 ft<sup>3</sup>). [Rule 404 (Madera), 406 (Fresno) and 407 (6 remaining counties in the San Joaquin Valley)]
2. Particulate matter emissions shall not exceed in concentration at the point of discharge 0.1 gr/dscf. [District Rule 4201; Rule 402 (Madera) and 404 (all 7 remaining counties in the San Joaquin Valley)]
3. Sulfur compound emissions shall not exceed 0.2% by volume, 2000 ppmv, on a dry basis averaged over 15 consecutive minutes. [Rule 404 (Madera), 406 (Fresno) and 407 (6 remaining counties in the San Joaquin Valley)]
4. Operator shall determine the sulfur content of each delivery of liquefied petroleum gas being fired in the IC engine. The sulfur content shall be determined using ASTM method D 2784-89. [District Rule 2520, 9.4.2]
5. The operator of an internal combustion (IC) engine shall maintain all records of required monitoring data and support information, for inspection by District personnel at any time, for a period of five years. [District Rule 2520, 9.5.2]
6. Compliance with permit conditions in the Title V permit shall be deemed compliance with the applicable requirements of SJVUAPCD Rule 4201; Rule 404 (Madera), 406 (Fresno), and 407 (Kings, Merced, San Joaquin, Tulare, Kern and Stanislaus). A permit shield is granted from these requirements. [District Rule 2520, 13.2]
7. Compliance with permit conditions in the Title V permit shall be deemed compliance with the following subsumed requirements: Rules 402 (Madera) and 404 (Fresno, Kern, Merced, Kings, San Joaquin, Stanislaus, Tulare). A permit shield is granted from these requirements. [District Rule 2520, 13.2]

## APPENDIX A

### EPA COMMENTS/DISTRICT RESPONSE

## **EPA COMMENTS / DISTRICT RESPONSE**

The EPA's comments regarding this template are contained in EPA's 10/1/96 letter. A copy of this letter is available at the District.

### **EPA COMMENT**

In the future, for all model general permit templates, the public notice should clarify that this will be the public's only opportunity to comment on the specific permit conditions of the template.

### **DISTRICT RESPONSE**

The suggested clarification will be incorporated into future public notices for general permit templates.

### **EPA COMMENT**

The District should add a statement to "Category B" of the Applicable Requirements section to clarify that Table 1 does not necessarily include all the requirements that may apply to a source that qualifies to use this template.

### **DISTRICT RESPONSE**

This clarification will be incorporated into the template. The second paragraph will be amended to state that Table I, Applicable Requirements, does not necessarily include all federally enforceable requirements that apply to internal combustion engines qualifying to use this template, and that it is the source's responsibility to determine any and all applicable requirements to which the source is subject.

### **EPA COMMENT**

In Table 1, District 4801 should be listed as Category 'D' and the corresponding county SIP rules should be listed as Category 'A'.

### **DISTRICT RESPONSE**

Table I, Applicable Requirements, will be amended by:

- a. Removing SJVUAPCD Rule 4801 from the Table (it is not submitted for approval into the SIP)
- b. Adding the county SIP rules corresponding to 4801 as 'Category A'

**EPA COMMENT**

The EPA suggests that the use of AP42 factors for PM compliance demonstration is insufficient for units with SCR and suggests an initial test or District provision of source test information to show compliance.

**DISTRICT RESPONSE**

The results of the template compliance demonstration show PM emissions are less than one-half percent of the allowable PM emission limit. Therefore, the District feels that no PM testing will be required. A question will be added to the template qualification form excluding units using SCR.

**EPA COMMENT**

Recordkeeping requirements for units that fire non-PUC regulated gas or diesel with supplier-certified sulfur content greater than 0.05% by weight should include fuel used and testing/sampling results.

**DISTRICT RESPONSE**

Units qualified to use this template must fire on PUC quality liquified petroleum gas with a sulfur content less than or equal to 0.008% by weight. The template requires the source maintain supplier certifications. This information must be maintained for a period of at least 5 years.

**EPA COMMENT**

District Rule 4305 and 4351 include CO limits that are not currently federally enforceable and not made so by any streamlining action. The District should either form a District-only portion of the template including CO limits or not include them in the template while forming a permit shield to exclude the CO limits.

**DISTRICT RESPONSE**

These rules are not applicable to internal combustion engines.

**EPA COMMENT**

The District may want to incorporate conditions for permit renewal into template permits.

**DISTRICT RESPONSE**

The Federal Register notice of April 24, 1996 announcing interim approval of the SJVUAPCD Rule 2520 states "Permits issued under a program with interim approval have full standing with respect to Part 70...". The requirement to reissue the general permit template every 5 years is not part of Rule 2520. Such a requirement is not currently federally applicable.

**EPA COMMENT**

Condition should be added stating that if a source is operating under a general permit or general permit template, and is later determined not to qualify for the template, only the portion of the facility covered by the template shall be subject to enforcement action for operation without a permit.

**DISTRICT RESPONSE**

The Federal Register notice of April 24, 1996 announcing interim approval of the SJVUAPCD Rule 2520 states "Permits issued under a program with interim approval have full standing with respect to Part 70...". The interim approval issue stated in this comment is not currently part of Rule 2520. Such a requirement is not currently federally applicable.

**EPA COMMENT**

A time period for reporting deviations consistent with SJVUAPCD's definition of "prompt," should be included in the template.

**DISTRICT RESPONSE**

Reporting of deviations is covered by the facility-wide template.

**EPA COMMENT**

Compliance certification language on the template qualification form should be made to conform with 40 CFR 70 requirements.

**DISTRICT RESPONSE**

The template will be submitted as part of a complete Title V application. The Title V application contains a Compliance Certification Form (TVFORM-005) in the SJVUAPCD Title V Permit Application Package). On the Compliance Certification Form the responsible official certifies to the truth, accuracy, and completeness of the title V application, including all supporting information.

**EPA COMMENT**

The template does not address the NOx emission standards that apply to these units.

**DISTRICT RESPONSE**

The NOx emission standard from District Rule 4701 is not currently federally enforceable. Once this rule is included in the SIP it will be addressed.

**EPA COMMENT**

There appear to be some typos in the permit conditions dealing with permit shields.

**DISTRICT RESPONSE**

These corrections will be made.

**EPA COMMENT**

Condition #3 should read "Unit shall be fired only on PUC quality natural gas with a sulfur content of less than 0.017% by weight."

**DISTRICT RESPONSE**

Condition #3 will be changed to read "Unit shall be fired only on PUC quality natural gas with a sulfur content of less than 0.017% by weight."

**EPA COMMENT**

Condition #4 should read "If the IC engine is fired...the operator shall maintain copies of all fuel invoices...."

**DISTRICT RESPONSE**

Condition #4 will be changed to read "If the IC engine is fired...the operator shall maintain copies of all fuel invoices...."

## APPENDIX B

### PUBLIC COMMENTS/DISTRICT RESPONSE

## **PUBLIC COMMENTS/DISTRICT RESPONSE**

No public comments were received on General Permit Template #SJV-IC-4-0.



## APPENDIX C

### LPG Fuel Sulfur Content

# American Standards of Testing and Materials Liquefied Petroleum Gas Specifications

Table 20. Liquefied-Petroleum-Gas Specifications\*

	Product designation			Test Method
	Propane	Butane	PB mixtures	
Vapor pressure at 100 °F. max, psig	210	70		D1267 or D2598
Volatile residue:				
Butane and heavier, %, max	2.5			D2163
Pentane and heavier, %, max		2.0	2.0	D2163
Residual matter:				
Residue on evaporation, +100ml, max ml	0.05	0.05	0.05	D2158
Oil-stain observation	Pass	Pass	Pass	D2158
Specific gravity at 60 °F		To Be	Reported	D1657 or D2598
Corrosion, copper strip, max	No. 1	No. 1	No. 1	D1838
Sulfur, grains/100ft <sup>3</sup> , max	15	15	15	D1266
Moisture content		To Be	Reported	
Free-water content		None	None	D1657

\* Refer to ASTM D1835 for full details.

From Marks' Standard Handbook for Mechanical Engineers (8th edition, McGraw-Hill)

APPENDIX D

TEMPLATE QUALIFICATION FORM  
FOR  
TEMPLATE # SJV-IC-4-0

## Template #SJV-IC-4-0

### Title V General Permit Template Qualification Form

District Permit # \_\_\_\_\_

Please answer the questions in the table below. An internal combustion (IC) engine which meets the criteria of this table is qualified to use this template as part of a Title V application. To use this template, remove this sheet and attach to application.

Yes	No	Description of Qualifying Units
		Is this internal combustion engine fired on liquefied petroleum gas (LPG)? If "yes", then continue to next question; otherwise STOP - you cannot use this template.
		Is this unit equipped with selective catalytic reduction (SCR)? If "no", continue to next question; otherwise STOP - you cannot use this template.
		Is the sulfur content of the LPG fired less than or equal to 0.008% by weight (15 gr/100 ft <sup>3</sup> )? If "yes", you qualify to use this template; otherwise STOP - you cannot use this template.

Based on information and belief formed after reasonable inquiry

- 1) the information on this form is true and correct and
- 2) the facility certifies compliance with this template's permit conditions:

\_\_\_\_\_  
Signature of Responsible Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name of Responsible Official (Please Print)

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